(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 471 503 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **91307259.1**

(22) Date of filing : **07.08.91**

(51) Int. Cl.[5] : **F02B 43/00,** B25C 1/08

(30) Priority : **14.08.90 US 567069**

(43) Date of publication of application : **19.02.92 Bulletin 92/08**

(84) Designated Contracting States : **DE FR GB SE**

(71) Applicant : **ILLINOIS TOOL WORKS INC.**
3650 West Lake Avenue
Glenview Illinois 60025-5811 (US)

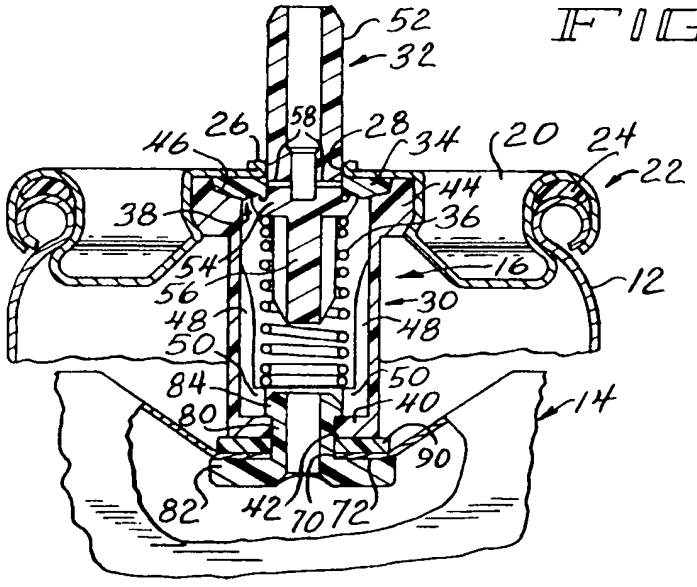
(72) Inventor : **Nikolich, Milovan A.**
3500 Elmwood Avenue
Wilmette, Illinois (US)

(74) Representative : **Rackham, Stephen Neil et al**
GILL JENNINGS & EVERY 53-64 Chancery Lane
London WC2A 1HN (GB)

(54) **Fluid dispenser.**

(57) A dispenser (10) for a dispensable fluid, such as hydrocarbon fuel, of a type comprising an outer canister (12) containing a pressurized propellant, an inner bag (14) containing the dispensable fluid, and a normally closed valve (20). The inner bag (14) has a flexible wall with an orifice (70) having a margin. Two clamping members (40,80,120,130), which may be snap-fitted to each other, clamp the valve (20) to the inner bag (14) at the margin of the orifice (70). A resilient washer (90) is disposed outside the inner bag (14), in intimate contact between one of the clamping members (40) and the margin of the orifice (70), so as to form a fluid-tight seal around the orifice (70).

FIG. 4



EP 0 471 503 A2

This invention relates to improvements in a dispenser for a dispensable fluid, such as a hydrocarbon fuel, of a type comprising an outer canister containing a pressurized propellant, an inner bag containing the dispensable fluid, and a normally closed valve enabling the dispensable fluid to be controllably dispensed from the inner bag.

As exemplified in US-A-4,403,722, US-4,483,474, and No. 4,522,162, it is known to use a dispenser of the type noted above to dispense a hydrocarbon fuel to a combustion gas-powered tool, such as a combustion gas-powered fastener-driving tool. Such fastener-driving tools and such fuel dispensers for them are available commercially from ITW-Paslode (a division of Illinois Tool Works Inc.) of Lincolnshire, Illinois, USA, under its IMPULSE™ trademark.

Typically, the inner bag of such a dispenser is made from a flexible, laminated, multi-layer sheet. The sheet may have an outermost layer of nylon film, an intermediate layer of aluminium foil, and an innermost layer of polyethylene film with suitable bonding layers between the aluminium and other layers. The polyethylene layer, which before heat-sealing is oriented, can be heat-sealed to itself.

Typically, moreover, the valve assembly includes a tubular part, which is molded from polyethylene, and which extends into the inner bag. It is known for the inner bag to be heat-sealed, at one of its seams, around and to such a part.

However, if the dispensable fluid is a hydrocarbon fuel, special sealing problems arise whereupon it may not be entirely satisfactory for the inner bag to be heat-sealed, at one of its seams, around and to such a part. A better way to mount the inner bag is required, particularly but not exclusively if the dispensable fluid is a hydrocarbon fuel.

According to this invention a dispenser for a dispensable fluid, the dispenser comprising an outer canister having a closed mouth and containing a pressurized propellant, an inner bag disposed within the outer canister, and valve assembly means including a normally closed valve closing the mouth of the outer canister and communicating with the inner bag for enabling the inner bag to contain the dispensable fluid when the valve is closed and for enabling the pressurized propellant to collapse the inner bag in such manner that the dispensable fluid is propelled from the inner bag through the valve when the valve is opened;

the inner bag having a flexible wall with at least one heat-sealed seam and an orifice the inner bag being sealed except at the orifice;

is characterised in that a margin of the orifice is spaced from every heat sealed seam of the inner bag;

and in that the valve assembly includes means for clamping the valve to the flexible wall of the inner bag at the margin of the orifice and for forming a substantially fluid-tight seal around the orifice.

Preferably, the valve assembly includes two clamping members, which are connected mechanically to each other in such manner that the valve is clamped to the flexible sheet used to make the inner bag at the margin of the orifice. One such clamping member is disposed at least partly inside the inner bag. The other clamping member is disposed at least partly outside the inner bag. The latter clamping member is connected structurally to the valve. It is preferred that a resilient washer is disposed in intimate contact between one of the clamping members and the margin of the orifice, preferably between the latter clamping member and the margin of the orifice, so as to form a substantially fluid-tight seal around the orifice.

One of the clamping members may have a tubular portion extending through the orifice, whereupon it also may have an annular portion integral with the tubular portion, and whereupon the other clamping member may have an annular portion disposed around the tubular portion. The resilient washer may be then disposed between the annular portion of one of the clamping members and the margin of the orifice.

Preferably, the annular portion of the clamping member having the tubular portion is disposed inside the inner bag, and the annular portion of the other clamping member is disposed outside the inner bag and is connected structurally to the valve. It is preferred for the resilient washer to be then disposed between the latter annular portion, which is disposed outside the inner bag, and the margin of the orifice.

It is preferred that the clamping members are adapted to be snap-fitted to each other. It is contemplated by this invention, however, that the clamping members may be threadably connected to each other or may be mechanically connected in some other manner to each other.

Particular embodiment of fluid dispensers in accordance with this invention will now be described with reference to the accompanying drawings; in which:-

Figure 1 is a perspective partly cut-away view of a fluid dispenser constituting a preferred embodiment of this invention with the inner bag shown empty;

Figure 2 is a side elevation of the inner bag and the valve assembly, with the inner bag shown flattened;

Figure 3 is a plan of the sheet used to form the inner bag and the valve assembly;

Figure 4 is a fragmentary, section taken along line 4-4 of Figure 1, in a direction indicated by arrows, with the valve assembly shown in a normal, closed condition;

Figure 5 is a fragmentary, section similar to Figure 4, but with the valve assembly shown in a

changed, opened condition; and,

Figure 6 is a fragmentary sectional view analogous to Figures 4 and 5 but of an alternate embodiment of this invention.

As shown in Figure 1, a dispenser 10 for a dispensable fluid, such as a hydrocarbon fuel, constitutes a preferred embodiment of this invention. The dispenser 10 may be advantageously employed in a combustion gas-powered fastener-driving tool, as exemplified in the Hikolich patents noted above. The dispenser 10 may be alternatively employed in any of a wide variety of similar and dissimilar applications.

Broadly, the dispenser 10 comprises an outer canister 12, an inner bag 14, and a valve assembly 16. The outer canister 12 may be conventionally made by a deep-drawing process or otherwise from aluminum, which is preferred, or steel. The valve assembly 16 closes an upper mouth 18 of the outer canister 12 and supports the inner bag 14 within the outer canister 12 so that the outer canister 12 is adapted to contain a pressurized propellant, such as propane or carbon dioxide, which tends to collapse the inner bag 14.

The valve assembly 16 includes a cover 20, which may be conventionally made from the metal used for the outer canister 12. The cover 20 is connected in a known manner to the outer canister 12, at a rolled seam 22 defining the upper mouth 18 and incorporating a resilient gasket 24. The resilient gasket 24 causes the rolled seam 22 to be substantially fluid-tight. An elastomeric material tending to be substantially impervious to the pressurized propellant is used for the resilient gasket 24, BUNA H synthetic rubber being preferred. The cover 20 has a rolled edge 26 defining a central aperture 28.

Moreover, the valve assembly 16 includes a tubular valve body 30, a valve stem 32, a resilient washer 34, and a coiled spring 36, as assembled to provide a normally closed valve 38. The tubular valve body 30 and the valve stem 32 may be advantageously molded from a suitable polymer, such as polyethylene, which is preferred.

The tubular valve body 30 is molded so as to have, at its lower end, an annular flange 40 extending inwardly in a radial sense and defining a central orifice 42, and so as to have, at its upper end, an annular boss 44 extending outwardly in a radial sense and upwardly and defining an annular recess 46. Moreover, the tubular valve body 30 is molded so as to have, along its inner wall, axially extending ribs 48, each terminating in a lower step 50 extending inwardly in a radial sense. Two such ribs 48 are shown, in diametric opposition to each other. More such ribs 48 may be optionally provided, in circumferentially spaced relation to one another.

The resilient washer 34 fits into the annular recess 46 and is retained therein by the cover 20, which partly overlies the resilient washer 34, and which is rolled partly under the annular boss 44. As retained therein, the resilient washer 34 is compressed slightly near its outer edge. An elastomeric material tending to be substantially impervious to the hydrocarbon fuel or other dispensable fluid it used for the resilient washer 34, BUNA N synthetic rubber being preferred.

The valve stem 32, which defines an axis, has an upper, tubular portion 52, an intermediate, annular portion 54, and a lower, rod-like portion 56. The upper, tubular portion 52 extends through the resilient washer 34 and through the central aperture 28 of the cover 20, with sufficient clearance to permit axial movement of the upper, tubular portion 52 relative to the resilient washer 34 and relative to the cover 20. The upper tubular portion 52 has a pair of radial, small diameter, oppositely extending passageways 58.

The coiled spring 36 is disposed around the lower, rod-like portion 56, so as to be axially compressed between the intermediate, annular portion 54 and the lower steps 50 of the axially extending ribs 48. Thus, the coiled spring 36 biases the valve stem 32 upwardly, so as to press the intermediate, annular portion 54 upwardly against the resilient washer 34.

Therefore, when the intermediate, annular portion 54 is pressed upwardly against the resilient washer 34, the passageways 58 are closed at their outer ends by the resilient washer 34, whereby the valve 38 is closed. However, when the valve stem 32 is pressed downwardly, so as to separate the intermediate, annular portion 54 from the resilient washer 34, the passageways 58 are moved below the resilient washer 34, whereby the valve 38 is opened. The valve stem 32 may be so pressed, in a known manner, by an actuator (not shown) included in a combustion gas-powered fastener-driving tool, as discussed above.

The inner bag 14 is similar to known bags for fluid dispensers in being made from a single, flexible, laminated sheet 60. The sheet 60 has an outermost layer of nylon film, an intermediate layer of aluminum foil, and an innermost layer of polyethylene film with bonding layers of ethylene vinyl acetate between the aluminum and other layers. The polyethylene layer, which before heat-sealing is oriented, can be heat-sealed to itself.

The inner bag 14 is different from known bags for fluid dispensers in being folded, not heat-sealed, along an upper edge 62. The inner bag 14 is heat-sealed, in a known manner, along two lateral edges 64, 66, and along a bottom edge 68.

Moreover, the inner bag 14 is different from known bags for fluid dispenser in being provided with a circular orifice 70, where the sheet 60 is folded along the upper edge 62. The orifice 70 has a margin 72 spaced from the lateral edges 64, 66, approximately half-way between such edges. The inner bag 14 is heat-sealed so as to be substantially impervious to the hydrocarbon fuel or other dispensable fluid,

except at the orifice 70, which is used (via the valve 38) to charge the inner bag 14 with the dispensable fluid and to empty the inner bag 14.

The valve assembly 16 includes two clamping members, which are connected mechanically to each other in such manner that the valve 38 is clamped to the flexible sheet 60 at the margin 72 of the orifice 70. The annular flange 40 of the tubular valve body 30 and a tubular clamping member 80 to be next described constitute the clamping members.

At its respective ends, the tubular clamping member 80 has an annular flange 82 and an annular boss 84. Before the inner bag 14 is heat-sealed at all of its lateral and bottom edges, the tubular clamping member 80 is passed through the orifice 70 in such manner that, when the inner bag 14 is heat-sealed thereat, the annular flange 82 is disposed within the inner bag 14. A resilient washer 90 is disposed around the tubular clamping member 80, outside the inner bag 14, in intimate contact with the margin 72 of the orifice 70. An elastomeric material tending to be substantially impervious to the hydrocarbon fuel or other dispensable fluid is used for the resilient washer 90, BUNA N synthetic rubber being preferred.

It is contemplated by this invention that the resilient washer 90 may be alternatively disposed around the tubular clamping member 80, inside the inner bag 14, in intimate contact between the annular flange 82 and the margin 72 of the orifice 70. Also, it is contemplated by this invention that the tubular clamping member 80 may be axially longer, that the resilient washer 90 may be thus disposed around the tubular clamping member 80, outside the inner bag 14, in intimate contact with the margin 72 of the orifice 70, and that a similar washer (not shown) may be also disposed around the tubular clamping member 80, inside the inner bag 14, in intimate contact between the annular flange 82 and the margin 72 of the orifice 70.

The tubular clamping member 80 with the resilient washer 90 disposed around it, outside the inner bag 14, is pushed through the orifice 42 of the annular flange 40 in such manner that the annular boss 84 snaps over the annular flange 40. As mentioned above, the tubular valve body 30 is molded from a polymeric material, such as polyethylene. The tubular element 80 is molded from a similar material. Such a material has sufficient resiliency and the tubular clamping member 80 and the tubular valve body 30 have suitable shapes to adapt the tubular clamping member 80 and the tubular valve body 10 to be snap-fitted to each other.

Thus, a snap-fitted, mechanical connection is formed between the tubular element 80 and the annular flange 40. Also, it is contemplated by this invention that a threaded, mechanical connection may be alternatively formed between male threads (not shown) on the tubular element 80 and female threads (not shown) on the annular flange 40.

As shown in Figure 6, an alternate embodiment is similar to the preferred embodiment shown in Figures 1 through 5, except as noted herein. The alternate embodiment utilizes an inner bag 100, which is similar to the inner bag 14, except that the orifice 102 of the inner bag 100 is larger than the orifice 70 of the inner bag 14. The orifice 102 has a margin 104 analogous to the margin 72 of the orifice 70.

In the alternate embodiment, a tubular valve body 110 is similar to the tubular valve body 30, except that the tubular valve body 110 is formed integrally with a tubular nipple 112 extending downwardly. At its lower end, the tubular nipple 112 has an annular boss 114. At its respective ends, a tubular clamping member 120, which is analogous to the tubular clamping member 80, has an annular flange 122 and an annular boss 124. The annular clamping member 120 has an internal, annular groove 126 and an external, annular boss 128. A clamping ring 130 is provided, which has no counterpart in the preferred embodiment. A resilient washer 140 is provided, which is analogous to the resilient washer 90.

The tubular clamping member 120 with the resilient washer 140 disposed around it, inside the inner bag 100, is pushed through the orifice 102, whereupon the clamping ring 130 is snapped over the tubular clamping member 120, between the annular boss 128 and the margin 104 of the orifice 102. Thus, the resilient washer 140 is compressed slightly, between the clamping ring 130 and the annular flange 122 of the tubular clamping member 120.

Thereupon, the tubular clamping member 130 is telescoped over the tubular nipple 112 until the annular boss 114 snaps into the annular groove 126, so as to form a mechanical connection between the tubular nipple 112 and the tubular clamping member 130, to which the inner bag 100 is clamped by the clamping ring 130-and the resilient washer 140.

Claims

1. A dispenser (10) for a dispensable fluid, the dispenser comprising an outer canister (12) having a closed mouth and containing a pressurized propellant, an inner bag (14) disposed within the outer canister (12), and valve assembly means including a normally closed valve closing the mouth (18) of the outer canister (12) and communicating with the inner bag (14) for enabling the inner bag (14) to contain the dispensable fluid when the valve is closed and for enabling the pressurized propellant to collapse the inner bag (14) in such manner that the dispensable fluid is propelled from the inner bag through the valve when the valve is opened;

   the inner bag (14) having a flexible wall with at least one heat-sealed seam and an orifice

(70) the inner bag (14) being sealed except at the orifice (70);

characterised in that a margin of the orifice (70) is spaced from every heat sealed seam of the inner bag (14);

and in that the valve assembly (20) includes means (40,80,120,130) for clamping the valve (20) to the flexible wall of the inner bag (14) at the margin of the orifice (70) and for forming a substantially fluid-tight seal around the orifice (70).

2. A dispenser according to claim 1, in which the valve means includes two clamping means (80,120 and 40,130) connected mechanically to each other in such manner that the valve (20) is clamped to the flexible wall of the inner bag (14) at the margin of the orifice (70), namely a clamping means (80,120) is disposed at least partly inside the inner bag (14) and a clamping means (40,130) is disposed at least partly outside the inner bag (14) and is connected structurally to the valve (20), the means (40,80,120,130) forming a substantially fluid-tight seal around the orifice (70).

3. A dispenser according to claim 2, wherein one of the clamping means (80,120) has a tubular portion extending through the orifice (70).

4. A dispenser according to claim 4, wherein the clamping means (80,120) having the tubular portion has an annular portion (82) integral with the tubular portion and wherein the other clamping means (40,130) has an annular portion disposed around the tubular portion.

5. A dispenser according to claim 3 or 4, wherein a resilient gasket (90) is disposed around the tubular portion.

6. A dispenser according to claim 5, wherein the resilient gasket is disposed between the annular portion of one of the clamping means (40,80,120,130) and the margin of the orifice (70).

7. A dispenser according to claim 4,5 or 6, wherein the annular portion (82) of the clamping means (80) having the tubular portion is disposed inside the inner bag (14) and wherein the annular portion of the other clamping means (40) is disposed outside the inner bag (14).

8. A dispenser of claim 7, wherein a resilient gasket (90) is disposed between the annular portion (40) disposed outside the inner bag (14) and the margin of the orifice (70).

9. A dispenser according to claim 7 or 8, in which the annular portion of the other clamping means (40) is connected structurally to the valve (20).

10. A dispenser according to any one of claims 2 to 9, wherein the clamping members (40,80,120,130) are adapted to be snap-fitted to one another.

FIG. 1

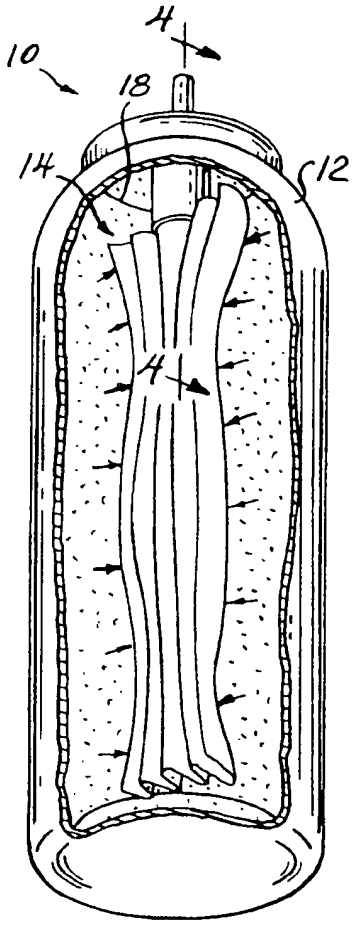


FIG. 2

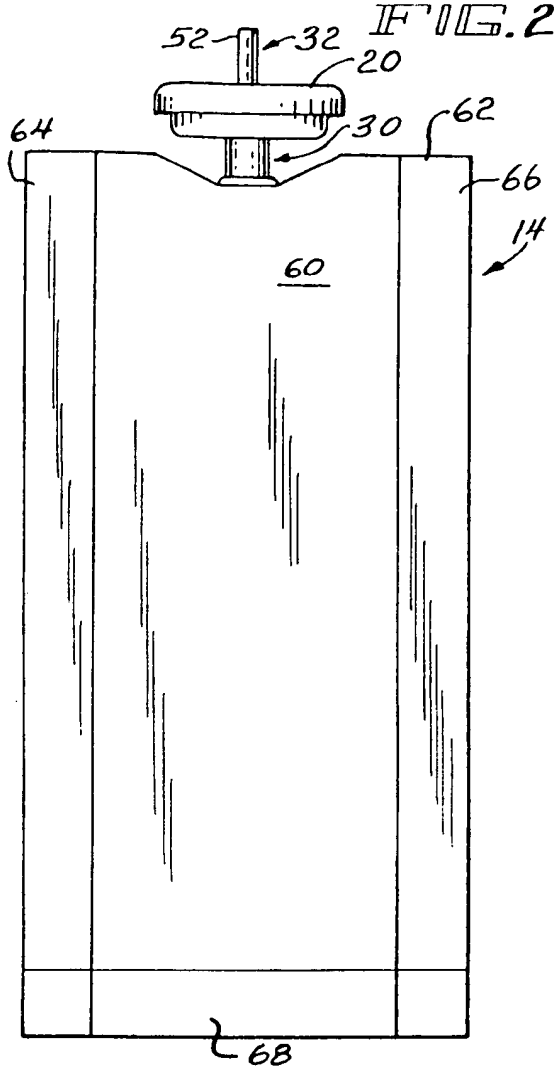


FIG. 3

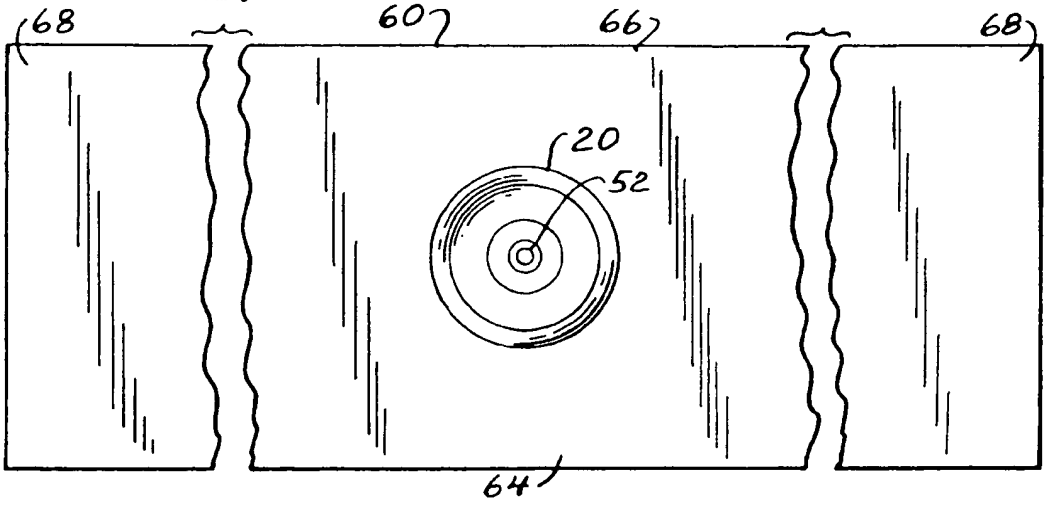


FIG. 4

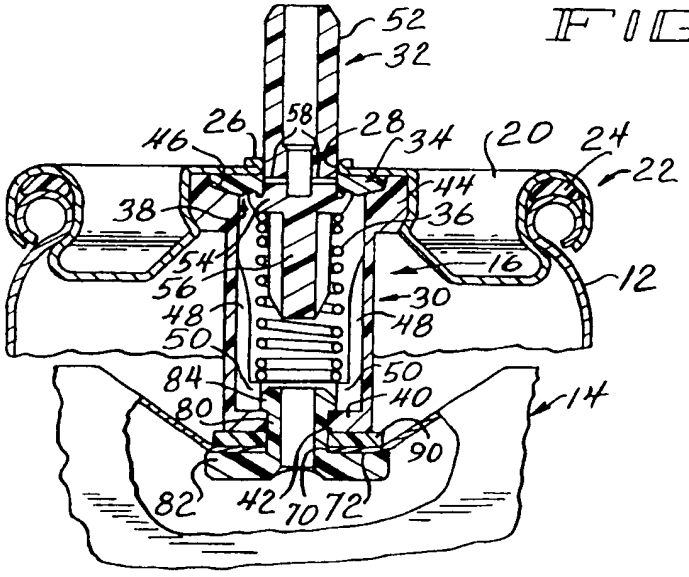


FIG. 5

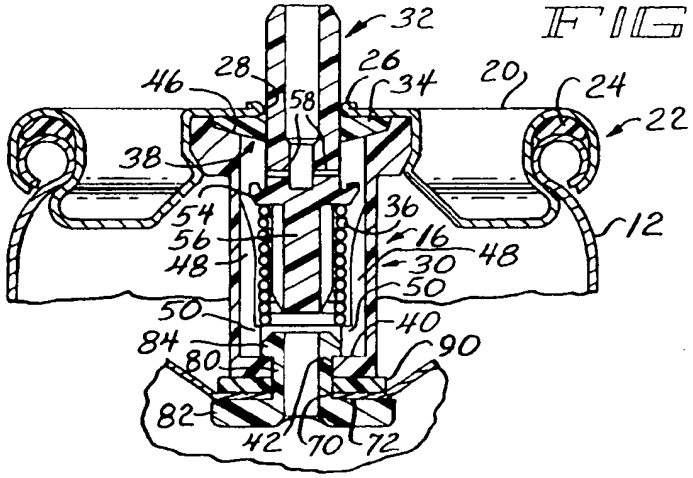


FIG. 6